NavMed 369 RESTRICTED

NAVY DEPARTMENT

BUMED NEWS LETTER

a digest of timely information

Editor - Captain Vincent Hernandez, (MC), USN

Vol. 7 Friday, January 4, 1946 No. 1

TABLE OF CONTENTS

* * * * * *

Treatment of Survivors After Exposure to Low Temperatures: During the war, German aviators were often forced to land in cold water and many of them perished as a result of exposure. For this reason, experiments using human subjects were performed at the Dachau concentration camp in an effort to determine the limits of endurance in cold water and to test various methods of

treatment after intense chilling. These investigations have recently been revealed, summarized and commented upon by appropriate authorities. Although sadism and perversions existed and some falsification of records occurred and must be taken into account in evaluating the German studies, it is nevertheless believed that the principal conclusions are probably valid.

It was found that human endurance varied from an average of 2 1/2 hours in water at from 35°to 45°F. to 8 hours at from 45°to 59°F. If the neck was held out of the water by supports, endurance time was considerably longer than if neck and occiput were immersed. A typical case was summarized as follows: after 30 minutes' immersion in water at from 35° to 45° F., the rectal temperature was 95° F., the skin temperature was 66° F. and rigor of the arms was noted; after 60 minutes, the rectal temperature was 89.6° F., the skin temperature was 61° F. and movements of voluntary muscles were impossible; after 80 minutes, the rectal temperature was 86° F., and the subject was unconscious; after 120 minutes, the rectal temperature was 78.8° F. and death was imminent. Death usually occurred when the rectal temperature was between 75.6° and 77.6° F.

In further descriptions of typical experiments, it was stated that upon entering the iced water the subjects suffered excrutiating pain and shivered intensely. Especially painful was the chilling of the neck and occiput. After from 5 to 10 minutes, there was a definite decrease in the intensity of the pain. There was pronounced rigidity of the muscles at 30 minutes and in some cases there were clonicotonic convulsions. As the muscles of speech and respiration became rigid these functions grew difficult. Some subjects complained that they felt as if an iron ring were drawn around their chests. Expiration was prolonged and difficult,and breathing gradually became stertorous but not deep. Many subjects showed profuse secretion of mucus and foamed at the mouth. By the time the subjects became unconscious the pupils were dilated, the light reflex was diminished and the gaze was fixed upward.

Cardiac changes followed a characteristic pattern in most of the experiments. After an initial tachycardia of about 120 beats per minute, the pulse became slower until it was about 50. When the rectal temperature fell as low as 86°F. the cardiac rhythm suddenly became totally irregular, but the rate remained slow. In some cases the irregular bradycardia was followed by irregular tachycardia, but in all fatal cases, sudden standstill of the heart followed an irregularity of the slow type. In all cases in which electrocardiographic records were taken, auricular fibrillation was observed. The rhythm became regular without the use of drugs after the rectal temperature had been restored to about 90 or 92°F.

In nearly all cases, respiration continued for as long as 20 minutes after heart sounds could no longer be heard. However, there is evidence that inaudible cardiac action persisted, and that death could be properly attributed to

heart failure in most instances. Damage to the heart and the onset of cardiac irregularities are ascribed to the direct action of cold on the myocardium and to the effects of lowered oxygen pressure in the coronary blood supply.

It was found that if cooling was interrupted by removing the subject from cold water, the rectal temperature nevertheless continued to fall in a linear fashion, to the extent of from 7° to 8° F. during a period of from 20 to 30 minutes. However, subjects with rectal temperatures of 80.6° F. or above always recovered after being removed from cold water if they were placed almost immediately in a water bath at from 115° to 122° F. Rapid rewarming of an acutely chilled subject by immersion in warm water was far more effective than was any other method tried. The other forms of therapy tested by the German investigators were rewarming by a light cradle, by means of a heated sleeping bag, by energetic rubbing of the whole body, by packing in blankets alone or with one or two normal naked human beings or animals, by diathermy of the heart, and by administration of various drugs.

Rapid rewarming of chilled survivors has long been considered dangerous. It is now believed, however, that in view of the results of the German investigations and the comments on them by outstanding American authorities, the treatment of survivors after exposure to low temperatures may be formulated as follows:

Survivors intensely chilled for brief periods: If unconscious, but breathing (this situation is likely to occur if rectal temperature is below 80.6° F.) the individual rescued from cold water should be immediately undressed and placed in a bath at from 115° to 120° F. for 10 minutes, then dried with a towel and placed in warm blankets. If the temperature does not rise at a rate of at least 2° F. every 10 minutes thereafter, immersion in warm water should be repeated until the rectal temperature reaches 93° F. There is considerable rise in temperature after removal from the warm water, and there is no advantage to be gained from rapid heating once this safe level has been regained. If a warm bath is not available, warm water should be poured into the sleeves, trouser legs and over the clothing and body, or the survivor should be carefully held under a warm shower. In any event, no time should be lost in applying treatment after rescue.

If conscious, the survivor should be immersed in water from 105° to 110° F. for 10 minutes, after which time treatment may be carried out as for the unconscious person. Water heated to 115° F. is painful to a conscious patient and may cause some scalding in chilled persons with rectal temperatures above 91° or 92° F. It appears likely, from the German reports, that survivors who are conscious when rescued from cold water will often survive without the aid of the warm bath if they are merely dried and placed in light cradles or electric heating bags.

Survivors exposed to moderately cold temperatures for long periods should be rewarmed much more slowly, preferably by the use of heated blankets, electric heating bags or light cradles.

Survivors exposed to dangerously low temperatures for long periods should be rapidly rewarmed, preferably by a warm bath, until the rectal temperature begins to rise. More gradual rewarming is indicated as soon as the immediate danger from extremely low temperature has passed.

Massaging is to be avoided under all circumstances. Drugs, such as strophanthin, digitalis, metrazol, lobeline, coramine and alcohol are of no value. In fact, the Germans experiments showed them to be harmful.

Administration of 100 per cent oxygen at atmospheric pressure should be advantageous by supplying dissolved oxygen not dependent upon hemoglobin dissociation.

Clinical thermometers do not register temperatures below 94°F. However, chemical thermometers are available aboard ships of many types (all of those having facilities for performing Kahn tests) and these may be used if ordinary precautions are taken to prevent breakage. Determinations of rectal temperature are of value in guiding therapy and, in addition, they constitute a very important part of the record of each survivor. Whenever possible, the temperature should be taken immediately after rescue while the warm bath is being prepared.

It is also urgently recommended that the temperature of the sea water at the site of rescue be determined and recorded in the survivor report.

According to Bazett, one important reason for the safety of rapid heating after abrupt cooling of short duration may be stated as follows:

Cooling is accompanied by reduction in blood volume which is achieved by general constriction of the vascular bed which in turn forces fluid into the tissues. During brief exposures, the fluid remains in the tissues and can readily return to the circulation when the peripheral vascular bed is again relaxed by warming. There is consequently no need to avoid sudden rise in temperature and thus maintain vasoconstriction.

On the other hand, in long exposure much of this fluid may be lost from the body by diuresis, and there may be other adjustments in the fluid distribution in the body, which are as yet unknown. Persons so exposed usually are unable to obtain adequate fluid by mouth, and the fluid reservoir normally existing in the contents of the gut may be seriously depleted. Vasodilation abruptly induced in such subjects by rapid rewarming may therefore suddenly increase the

vascular bed at a time when adequate fluid is not available to fill it. The blood volume cannot be adjusted to the enlarged vascular bed, and a condition similar to that of surgical shock is thus induced. (Res. Div. - BuMed)

* * * * * *

Effect of High Protein Diet on Thermal Balance: Studies are reported on the gaseous metabolism, the body and skin temperature, and the subjective responses of men on diets either high or low in protein under controlled conditions of muscular work and environmental temperature.

The ingestion of large amounts of protein in the daily diet appears to contribute to the maintenance of thermal balance in man during exposure to low air temperature.

After a subject has been maintained for some time on a diet rich in protein, a slightly higher average rectal temperature was more frequently observed than when the same subject had previously lived on a diet of normal proportions of protein. These changes in the level of the rectal temperature may be associated with the increased heat production which was observed with subjects following their ingestion of a protein-rich diet.

The ingestion of a diet rich in protein may add something to the physical comfort and thermal balance of man during exposure to cold, which is not furnished by clothing alone. The experimental data obtained cast some doubt on the existence of Rubner's "chemical regulations" of body heat. (OEMcmr-425, Long et al, Cornell Univ. - CMR Bulletin #51)

* * * * * *

Effect of Feeding After Semi-Starvation: Twelve of a group of volunteers subjected to semi-starvation are being studied during "rehabilitation." Diets of less than 3,400 calories failed to produce satisfactory weight gains or a feeling of satiety. After 12 weeks of feeding, the men were still weak, anemic, and highly deficient in capacity for hard work. Basal metabolism, pulse rate, blood pressure, and other measures showed only a small response even in the face of appreciable weight gains and a sharp reduction of edema.

It is too early to come to detailed conclusions regarding proper relief diets or the efficacy of given levels of refeeding after prolonged, severe undernutrition. Certain indications are so clear, however, and the implications so important, that some tentative suggestions are made.

After semi-starvation comparable to that produced here, men between the ages of 20 and 35 who are required to do only light work will show little or no

improvement for months on a diet providing less than 2,500 calories daily. Even on a diet as high as 3,000 calories daily, the improvement to be expected is so slow that many months will pass before anything like previous functional capacity will be approached.

An early indication of rehabilitation at a level far below the optimum is the replacement of apathy in many men by more expressed irritation and overt anti-social or uncooperative behavior.

The addition of vitamin supplements to a simple "caloric" relief diet, such as used here, produces little if any indication that such supplementation is beneficial, or even necessary, at any caloric level.

Isocaloric substitution of protein for carbohydrate, so as to increase the protein intake from 20 to 50 gm. per day above minimal levels of the order of 60 gm. per day, may have some value, but this is at best very small, and is far less important than an increase in calories. (OEMcmr-27, Keys, Univ. of Minn., - CMR Bulletin #67)

* * * * * *

Nutrition in Acute and Chronic Illness: Injury seems to effect a sudden and profound transformation of the metabolism that exhibits itself in certain disturbances of the chemical composition of the blood. The formation of serum albumin seems to be inhibited, the synthesis of protein in general to be impaired. It is not altogether proper to say that the endogenous protein metabolism is accelerated. The actual destruction of body protein, at least immediately after the injury, is not extremely large. The cumulative losses in the subsequent period are considerable. When protein is given, urinary nitrogen immediately rises. The protein appears to be routed directly to destruction in the liver. It is as if the system were short-circuited in such a way that synthesis of protein is excluded and only the pathway to urea formation is left open. It is impossible, as yet, to decide whether the primary derangement is acceleration of the destructive or impairment of the synthetic processes. If accelerated catabolism is the primary defect, its origin should be sought in some disorder of hepatic function.

If, it proves impossible or unprofitable to prevent or mitigate losses of tissue protein after acute insults, a certain amount of wasting with attendant delay of convalescence and rehabilitation will have to be accepted as an inevitable consequence of these insults. Nevertheless, this delay should at least be reduced to a minimum. "Toxic destruction of protein" is self-terminative, even if the condition which provoked it advances progressively. This protein wastage is a phenomen of acute, not chronic, disease. In chronic debilitating conditions and in acute pathological states after the

catabolic phase has ended, the synthetic powers are intact. Since the duration of the catabolic phase is unpredictable, the advent of the anabolic phase must be anticipated. The dietary regime should be so prescribed that the patient will be assured of as much protein as he can utilize and just as soon as he is able to store any protein at all. (OEMcmr-420, Peters, Yale Univ., Ms. for publication - CMR Bulletin #66)

* * * * * *

(Not Restricted)

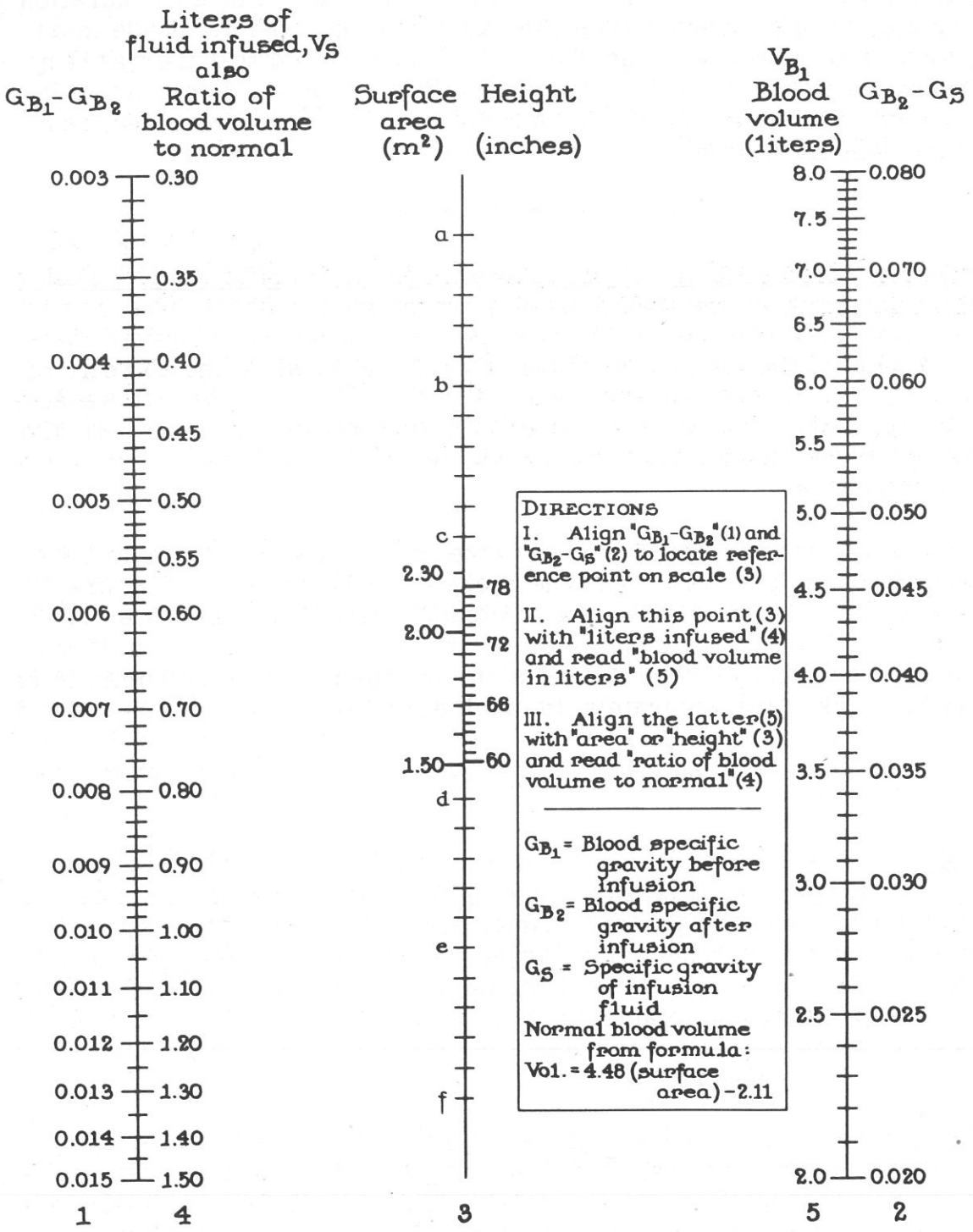
Estimation of Blood Volume from Change in Blood Specific Gravity Following a Plasma Infusion: In the treatment of wounded men in shock, the rapid intravenous infusion of plasma is almost a routine procedure to prevent further deterioration of the clinical condition of the patient, while the extent of injuries and the clinical condition are being evaluated. If one can add to this evaluation a quick approximation of the blood volume obtained by estimating the dilution caused by the infused plasma, one will have information of value in deciding further therapy.

Recent studies provide data which indicate that the blood volume can be estimated, within ± 15 per cent, from the decrease in blood specific gravity caused by infusion of isosmotic plasma or albumin solution. The specific gravity determinations on 3 samples - blood drawn before the infusion, blood drawn from 5 to 10 minutes after the infusion, and the plasma or albumin to be infused can be quickly and accurately determined by the copper sulfate method. (See Bumed News Letter, June 25, 1943). About 2 minutes suffice for the determination of specific gravity and for the calculation of blood volume from the line chart (appended).

Technic: A sample of blood (B_1) is drawn. From 500 to 1500 c.c. of normal plasma, or of lyophilized plasma made up to contain about 8 per cent of solids, or of approximately 5 per cent human albumin solution are rapidly infused (50-100 c.c. per minute). The larger the volume of plasma or albumin solution infused, the more accurate will be the blood volume estimation. Five hundred c.c. is the smallest volume that will yield a usefully accurate blood volume figure. From five to ten minutes after completion of the infusion, a second sample of blood (B_2) is drawn.

Whole-blood specific gravities (GB_1 and GB_2) of blood samples B_1 and B_2 are then determined as is the specific gravity (Gs) of the infused protein solution. These values, together with the volume (Vs) of the infused solution, are used to calculate the whole blood volume by Equation 2 on the line chart.

The blood samples should be drawn into dry syringes. One c.c. samples of blood are adequate, unless other analyses are desired. An anticoagulant is usually unnecessary as the specific gravities can be determined at once



Calculation of Blood Volume from the Change in Blood Gravity Due to Infusion of Plasma or Similar Fluid

by dropping blood from the syringe into the copper sulfate solutions. However, if it is desirable to use an anticoagulant and to determine the specific gravities later, heparin, 0.2 mg. per c.c. of blood, is the ideal anticoagulant, while the oxalate mixture of Heller and Paul is almost as satisfactory.

Calculation.

Let VB_1 = blood volume before plasma infusion.

GB_1 = blood specific gravity before plasma infusion.

GB_2 = blood specific gravity after plasma infusion.

Vs = volume of plasma infused.

Gs = specific gravity of plasma infused.

Equating two values for weight of whole circulating blood plus infused album solution or plasma (weight = volume x specific gravity) we have

1) $$VB_1\, GB_1 + Vs\, Gs = (VB_1 + Vs)\, GB_2$$

Sum of weights before infusion — Weight in circulation after infusion

Whence:

2) $$VB_1 = Vs\, \frac{GB_2 - Gs}{GB_1 - GB_2}$$

The blood volume in liters and the ratio of blood volume to normal are easil computed by use of the accompanying line chart. The specified points are best aligned with a silk thread or transparent ruler. The first alignment gives the quotient $(GB_2 - Gs)/(GB_1 - GB_2)$, the second alignment multiples the quotient by Vs to give the desired VB_1, and the third gives the ratio of VB_1 to the average blood volume for an adult male of the size of the subject. (Hosp. of the Rockefeller Inst. for Med. Res. and the U. S. A. Typhus Commission Unit, Cairo, Egypt - Phillips et al)

* * * * * *

Comparison of Therapeutic Measures in Rheumatic Fever: Gubner and Szuc have carried out a comparative therapeutic study in 150 cases of acute rheumatic fever. The types of therapy included: sodium salicylate and sodium bicarbonate

(Not Restricted)

(4.0 to 6.7 Gm. of each daily), 33 cases; sodium salicylate (from 4.0 to 6.7 Gm. daily) and ascorbic acid (200 mgm. daily), 32 cases; calcium double salt of benzoic acid and succinic acid benzyl ester (from 4.0 to 5.3 Gm. daily), 55 cases; sulfathiazole (6 Gm. daily), 15 cases; penicillin (50,000 units daily), 5 cases; and sodium bicarbonate alone (4.0 Gm. daily), 10 cases.

Sulfathiazole, penicillin, and sodium bicarbonate alone were without demonstrable therapeutic effect. No striking difference was evident in the two groups of cases receiving salicylate other than noteworthy diminution in toxicity in the patients receiving ascorbic acid in place of sodium bicarbonate.

Comparison was made between the 65 salicylate-treated cases and the 55 cases receiving the succinate compound. The average age in the two groups was identical as was the severity of the disease, as judged by fever, leukocytosis, accelerated sedimentation rate, degree of polyarthritis and lowering of plasma ascorbic acid. It was found that on all points analyzed, the cases receiving the succinate compound and ascorbic acid responded more favorably than did those receiving salicylate. The duration of acute symptoms, that is, fever, leukocytosis accelerated sedimentation rate, and total days of hospitalization were uniformly and significantly abbreviated. Signs of carditis developed in 69 per cent of the succinate-treated cases. Relapses of rheumatic activity occurred in 7 of the salicylate-treated cases, whereas no relapses developed in the succinate-treated cases. Drug toxicity was noted in 19 per cent of the salicylate-treated cases but in only 1 case (2 per cent) of the cases receiving the succinate compound.

Attention is called to the role of succinic acid as a catalyst in biologic oxidation. Evidence is cited that a widespread interference with various constituents involved in tissue oxidation occurs in rheumatic fever -- that is, porphyrinuria, lowering of plasma ascorbic acid and vitamin A levels and changes in glutathione. It is suggested that there is an oxidative inactivation of various enzymes in this disease, and that administration of succinates not only may prevent inhibition of succinic dehydrogenase (cytochrome C reductase) but also, as an active reducing agent, it may also prevent inactivation of other respiratory enzymes. Calcium and ascorbic acid enhance the activity of succinic dehydrogenase and therefore the administration of ascorbic acid, as well as the calcium salt of the succinic acid compound studied, appears to be indicated. (It should be noted that the doses of salicylate employed in this study were smaller than those recommended by some authorities - Ed.) (N. Eng. J. Med., Nov. 29, '45)

* * * * * *

(Not Restricted)

The Virus of Poliomyelitis: While the virus of poliomyelitis can be identified only by its ability to produce experimental poliomyelitis in a susceptible animal, it has other fairly distinct properties. One of the smallest of the filtrable viruses, its size is estimated at from 10 to 15 millimicrons. In comparison with many bacteria it is quite stable, remaining viable at ice

box temperature in aqueous suspensions of feces for months, and in pieces of infected spinal cord stored in 50 per cent glycerin for years. Although it can survive in weak solutions of phenol and in high concentrations of ether, it is readily destroyed by oxidizing agents, such as hydrogen peroxide and potassium permanganate, by ultraviolet rays, and by heating for short periods to a temperature of 55° C. The resistance of the virus of poliomyelitis to chlorine has not been accurately determined; probably the amount of chlorination adequate for killing enteric bacteria may not suffice to destroy it.

This virus has highly neurotropic tendencies and a limited host range. For the most part, it is pathogenic only for certain primates - monkeys, chimpanzees, and man. With some strains, adaptation to rodents has been successful in that the eastern cotton rat has been infected and subsequently the virus has been passed in mice. In all of the susceptible species, whether in man, monkey, or mice, this virus exerts a peculiarly selective and destructive action on the anterior horn cells of the spinal cord; while other parts of the central nervous system are invaded, the damage wrought there is not so serious.

As with other neurotropic viruses, a number of different strains have been described. Appreciation of this multiplicity of strains in poliomyelitis is important when it comes to an estimate by neutralization tests of immunity to this disease, both in animals and in man. Such tests, as yet, are not very practical, nor has it been possible to demonstrate specific immunologic reactions for clinical use by means of precipitin tests, complement-fixation tests, or cutaneous tests such as are used in other virus diseases. While this has seriously limited the study of human immunity in poliomyelitis, there is reasonable hope that such tests may be developed in the near future.

Something is known about the extra-neural distribution of this virus within the human body. The virus is present in the oropharynx during the first week of the disease, but it is more readily demonstrable in the feces and for a longer period of time - six or eight weeks from onset. It may also be found in the intestinal canal many days prior to the development of myelitis. In healthy carriers, the virus has been detected both in the oropharynx and in the feces. In fatal human cases at autopsy, beside being found in the spinal cord and brain, the virus has been detected in the pharyngeal wall, but it is much more readily demonstrable in the intestinal wall and intestinal contents. It is pertinent to note that when injected either subcutaneously or intracutaneously into monkeys or chimpanzees, this virus subsequently gains access to the intestinal canal and is excreted in the stools of these animals, either with or without the obvious production of myelitis in the inoculated animal.

How the virus actually enters the human body in order to localize eventually in these sites has not been determined. Such penetration presumably could occur through at least three portals: the nasal mucosa, the oropharynx, or the skin.

(Not Restricted)

While the first was accepted for many years as the most likely, now the upper nasal mucosa at least seems unlikely, so far as the olfactory bulbs or their nerves are concerned, in acting as neuropathways to the brain. This is because of almost universal failure to find lesions in olfactory bulbs at autopsies of humans, even though such lesions are characteristically found in the monkey when the disease is induced experimentally by installation of the virus in the nares. Certain of the more susceptible varieties of monkeys can be infected by all three routes, as well as by other routes. Chimpanzees can be infected by feeding the virus or injecting it under the skin. Man is known to have been infected accidentally by subcutaneous inoculation of the virus.

Considered in a general way, the epidemiological implications which these three portals suggest are: if the nasal mucosa is the main portal of entry of the virus in man, it suggests that the infection is air-borne or droplet-borne, as in influenza or the common cold; if the oropharyngeal portal is the main one, it suggests that the virus contaminates objects which find their way into the mouth and thus the infection might be food-borne or water-borne, as is typhoid fever; if entry by way of the skin is important or even common, it suggests that the infection might be insect-borne, or that the virus might be rubbed into an injury. These three explanations do not cover the whole list of possibilities. It remains for future work to determine how these possibilities fit in with the general epidemiological picture. (Bull. Army Med. Dept., Dec. '45 - J. R. Paul)

* * * * * *

Orally-Administered Penicillin: An attempt has been made to trace the fate of orally-administered penicillin in an effort to establish the reason for the relative inefficiency of this route for administration. On the basis of the observations which have been presented, it is concluded that absorption of ingested penicillin occurs chiefly from the duodenum. The amount of absorption which occurs from the stomach is not established, but it is probably small. Inactivation of penicillin as a result of the acidity of the gastric content is conditioned by a number of variables, and on the whole is seldom great.

Absorption of penicillin is rapid. The maximum concentrations are attained in the blood within from 30 to 60 minutes of ingestion. The subsequent persistence of penicillin in the blood is a reflection of the height of the maximum concentration originally attained, and does not appear to be a result of continued absorption from the alimentary tract. Absorption of ingested penicillin is incomplete. Two-thirds or more of an orally-administered dose are apparently not absorbed. Once penicillin has passed through the small intestine, only insignificant amounts are absorbed. The penicillin in the intestine which is not absorbed is inactivated by the bacteria in the colon, or, if an excess be present, it is excreted in the feces.

The necessity for the use of larger amounts of penicillin by the oral route than by the intramuscular route is primarily the result of incomplete absorption and cannot be explained satisfactorily on the basis of destruction by acid or bacterial action. (OEMcmr-435, McDermott et al, Cornell Univ., Ms. for publication - CMR Bulletin #65)

* * * * * *

(Not Restricted)

Prevention of Dental Caries by Brushing the Teeth with Powdered Fluorapatite: The teeth of 120 enlisted men of the U.S. Army were examined for dental caries at the beginning and end of a 1-year period during which they were taking medical training. Of these, 40 were given powdered fluorapatite with which to brush their teeth, and 80 were used as controls. Some of the 40 brushed their teeth daily for 1 year with the fluorapatite which contained nearly 4 per cent fluorine. Others neglected its use after a longer or shorter period of time. The 40 using the fluorapatite developed an average of 0.5 new cavities per man per year, whereas the controls developed 1.5 cavities per man per year.

It has been observed also that dental caries is greatly delayed in appearance but is not eliminated in rats whose teeth have been brushed with fluorapatite. (J. Dental Res., June - Aug. '45 - McClendon and Carpousis)

* * * * * *

Selection of Men for High Altitude Flight: A complete physical examination and thorough indoctrination should be given to every man contemplating high altitude flight (above 20,000 ft.). If this is carefully done, the men examined should be able to fly at high altitudes with reasonable safety. The present decompression-sickness classification test as a test of tolerance seems to be more rigorous than actual plane flight. For this reason, the results of such a test should be carefully weighed before disqualifying a man on the basis of chamber rating alone. However, it is advisable to require that men susceptible to decompression sickness have at least one hour preoxygenation before going above 30,000 ft. for any length of time in a plane. The data obtained from the chamber experience clearly demonstrate that men over 30 are more susceptible to decompression sickness than are younger men, and that men 10 pounds or more overweight have a higher incidence of decompression sickness than do those who are 10 pounds or more underweight. (OEMcmr-38, Prout et al, Yale Univ. - CMR Bulletin #62)

* * * * * *

(Not Restricted)

Some Neurological Signs and Symptoms Produced in Man by Centrifugal Force: The neurological effects in man of centrifugal force were studied in 542 subjects during 5544 test runs at from 2 to 10 G in the man-carrying centrifuge.

(Not Restricted)

As a measure of performance during exposure to centrifugal force, the reaction time for manual responses to visual and auditory stimuli was recorded at from 2 to 8 G on 35 subjects, and was found not to be significantly increased, except in the case of visual stimuli immediately before black-out.

As a result of exposure to increased G, however, convulsions frequently occurred, usually after loss of consciousness. These were usually slight, clonic seizures involving all or some of the extremities, face and trunk. Less commonly, severe generalized convulsions were observed. These varied greatly and sometimes included a brief tonic state with neck and trunk in extension, occasionally with arms extended in pronation and legs drawn up in flexion. Conjugate movements of head and eyes to one side were sometimes observed. Usually, violent jerks of the extremities and trunk terminated the seizure in from 2 to 5 seconds. Finally, a small number of slight convulsions were noted in fully conscious subjects. Dreams were frequently experienced, usually in association with convulsions. Paresthesias, confused states, amnesia and more rarely, gustatory sensations were noted with black-out and loss of consciousness, either with or without convulsions. Incontinence was never observed.

The susceptibility to convulsions varied greatly and could not be correlated with any of the measured characteristics of resting electroencephalograms, which were normal for 51 subjects. Records of facial blanching and flushing, ear opacity and electrocardiograms showed that convulsions started during the recovery phase of the circulatory changes.

Electroencephalograms taken from bipolar leads over the motor area of the cortex, during increased G, showed that alpha waves were replaced by high frequency, low-amplitude waves in fully conscious subjects. With deep black-out and onset of unconsciousness, progressively slower waves of higher amplitude usually appeared and remained until shortly before consciousness was regained. This pattern was not altered by convulsions.

Considering the small difference in specific gravities of cerebrospinal fluid and brain tissue, and their anatomical dispositions, it is unlikely that the neurological effects described in this paper are due to any mechanical action of increased positive G on the brain other than diminished cerebral circulation. (J. of Physiol., June '45 - Franks et al)

* * * * * *

(Not Restricted)

Disappearance of Peptic Ulcer After the Feeding of Normal Human Gastric Juice: The gastric juice of normal volunteer subjects, which had been neutralized, filtered and preserved with tricresol, was fed to a series of patients with uncomplicated peptic ulcer.

(Not Restricted)

Relief of symptoms of peptic ulcer and prompt roentgen disappearance of peptic ulcer followed.

Evidence was obtained which tends to indicate that a "protective principle" is elaborated within the gastric and duodenal mucous membranes which is secreted into the gastric juice. This protective principle may be lacking or may be impaired in patients with peptic ulcer. (A. J. Digest. Dis., Oct. '45 - Morrison)

* * * * * *

Penicillin in the Treatment of Neurosyphilis: Following the use of penicillin, the outstanding result common to most of the members of a series of 140 patients with neurosyphilis was a return of the cell count, protein and gold curve of the cerebrospinal fluid to within normal limits, and a decrease in titer of the serologic reactions of the blood. The outstanding clinical effects, as noted among patients who had objective and subjective signs of neurosyphilis, were a gain of weight and a reduction of severity and frequency of the pains in the legs. The early symptoms of general paresis were not influenced by the treatment.

The patients who had meningeal neurosyphilis were most responsive both clinically and serologically, while patients who had the parenchymatous forms of the disease were helped only slightly, if at all. The best serologic results were among the patients who had asymptomatic neurosyphilis and who received penicillin intravenously in doses approximating 1,200,000 units in a week, in association either with three spinal drainages or with intraspinal treatments. (Swift-Ellis type).

Penicillin given in combination with fever therapy (fever machine or malaria) did not improve the clinical results noted from fever treatment alone. The results obtained after the administration of penicillin by the intravenous, intramuscular, or intraspinal route, alone and in combination with fever therapy, lead us to believe the penicillin alone is not capable of controlling the parenchymatous forms of neurosyphilis. However, in cases of the meningeal forms of the disease, and in those in which there was a high degree of pleocytosis in association with asymptomatic neurosyphilis, the results thus far are encouraging. In occasional cases of neurosyphilis, penicillin therapy produces clinical and serologic results that are outstanding. However, these favorable results are noted in only a few cases and often appear when least expected. It is not possible at this time to account for such great therapeutic discrepancies. (O'Leary et al, Mayo Clinic, Ms. for publication - CMR Bulletin #67)

* * * * * *

(Not Restricted)

Blood and Spinal Fluid Tests for Syphilis in Patients with Malaria: Potter and co-workers have tested the blood and spinal fluid of 100 consecutive hospital admissions of patients with malaria, within 48 hours of their entrance into hospital. (It is not stated how many of these patients were pyrexial at the time - Ed.) One patient was infected with Plasmodium falciparum, and the remainder with Pl. vivax. All were without history of syphilis, and had had at least one negative serum test for syphilis (and often several) and had passed at least 24 physical examinations; it was assumed, therefore, they were all nonsyphilitic. Of the 100 sera, 12 gave a positive reaction to the Wassermann and/or Kahn test and 10 gave a doubtful reaction to one or both tests.

The spinal fluid Wassermann reaction was negative in all cases. In one fluid there was an increase in white blood cells and in 3 cases there was an increase in total protein. All other tests, including the Lange, were within the bounds of normality.

Negative serum reactions were obtained within 30 days in all cases. (J. A. M. A. - Mar. 24, '45)

* * * * * *

Preservatives for Biological Products: A review of the literature on preservatives reveals a confusing terminology and a need for comprehensive methods for evaluating antibiotic agents whether they be for in vitro or parenteral use. An ideal preservative for blood protein solution is little short of being the ideal chemotherapeutic agent.

Merthiolate 1:10,000 has been found to be ineffective against even very small bacterial inocula in 25 per cent albumin solutions and in other plasma protein fractions.

Carboxymethoxylamine hemihydrochloride (Compound I) is bactericidal in large concentrations (from 100 to 1,000 mg. per cent) and bacteriostatic in smaller concentrations (30 mg. per cent) for all common Gram-negative and Gram-positive laboratory contaminants, provided the inoculum is 1,000 organisms per c.c. or less. Chance bacterial contaminations during aseptic technics usually do not exceed this figure. The human toxicity of the drug is great enough to prevent its use as a preservative in protein solutions for parenteral injection. It is useful, however, in certain in vitro manipulations of concentrated protein solutions such as are necessary in the preservation of isoagglutinins.

The following compounds have been found to be unsatisfactory preservatives: chloroform; toluol; propylene glycol; dipropylene glycol; trimethylene glycol; beta, beta' dihydroxyethyl ether; cresol; and alpha, alpha' dipyridyl.

It is concluded that the best means of preservation of concentrated protein solutions for parenteral injection is the use of rigid aseptic technics combined with filtration and, where possible, modified pasteurization. (OEMcmr-453, Favour, Harvard Univ. - CMR Bulletin #65)

* * * * * *

(Not Restricted)

Opportunities in Psychiatry: A Psychiatric Personnel Placement Service has been organized under the auspices of the American Psychiatric Association and the National Committee for Mental Hygiene. Captain F. M. Harrison (MC), USN, Ret'd, is the director. The purpose of this Service is to aid psychiatrists who are being separated from Military Service in securing positions or additional training in the field of psychiatry.

The facilities of this Service are also available to returning physicians who are interested in psychiatry and who may wish to know of the opportunities for initial training in this field.

Those who wish to make application should write to the Director, Psychiatric Personnel Placement Service, the National Committee for Mental Hygiene, New York 19, N. Y. Applications should include a statement of previous training, qualifications and experience in medicine and psychiatry, and the type of position or training desired.

* * * * * *

(Not Restricted)

Annual Meeting of American College of Physicians: The American College of Physicians has announced that its next annual meeting will be held in Philadelphia, Pa. in 1946, May 13-17, inclusive. The General Chairman is Dr. Georg M. Piersol of Philadelphia.

* * * * * *

(Not Restricted)

Security of Medical Topics: In a memorandum dated 30 November 1945, Joint Security Control has announced that all security restrictions have been removed on BAL.

* * * * * *

(Not Restricted)

War Reprint Service Ended: The Josiah Macy, Jr., Foundation has announced the termination of its War Reprint Service as of 1 January 1946.

* * * * * *

(Not Restricted)

Bumed News Letter for Officers Separated from Service: The Surgeon General has approved a plan to continue sending the Bumed News Letter (NavMed 369) to Reserve Officers of the Medical Corps and of the Dental Corps for a period of six months following separation from the Service.

Such officers will facilitate execution of this plan if they will inform the Bureau of the address to which the Letter may be sent. Notices of permanent address or change of address should be sent to the Chief, Bureau of Medicine and Surgery, Navy Department, Washington 25, D. C. Attention: Publications Distribution Section.

* * * * * *

(Not Restricted)

The Naval Medical activities listed below have been disestablished by authority of the SecNav. Disestablishing letters in full may be found in the Navy Department Semimonthly Bulletin of 30 November 1945.

Op24B-pd, Serial 71P24, 16 November 1945

Advance Base U. S. Hospital 16,
Biak Island, Netherlands East Indies.
Advance Base U. S. Hospital 17,
Hollandia, New Guinea.

Op24C-pd, Serial 61P24, 16 November 1945

U. S. Naval Base Hospital No. 8,
Pearl Harbor, Oahu, Territory of Hawaii.

Op24-pd, Serial 128P24, 26 November 1945

U. S. Naval Base Hospital 19,
Tinian Island, Marianas Islands.

Op24-pd, Serial 116P24, 26 November 1945

U. S. Naval Special Hospital,
Banning, California.

* * * * * *

(Not Restricted)
S94-(3)-(6) (883)
EN28/A2-11
28 November 1945

To: All Ships and Stations.

Subj: Compressed-Air Illness, Reported Case of.

Ref: (a) Diving Manual, 1943 Edition.

1. During recent joint Army-Navy ship salvage operations, a case of compressed air illness was reported. An abstract of this report is published herein for the information of all naval personnel concerned with diving operations.

(a) A 38-year-old Army diver made two dives to 88 feet, one from 0900 to 1100 and the other from 1300 to 1500 on the same day. No decompression was given although tables were available and he was cognizant of the fact that decompression was required. At 1800 on the same day he experienced sudden sharp pain in his left shoulder, elbow, and wrist which he described as similar to pain experienced on a previous occasion when he had the "bends." At 2000 the medical officer advised a hot shower and rubdown. However, the pain became progressively worse and at 0200 of the following day, the medical officer gave two tablets of codeine for relief of his pain. There was no recompression chamber immediately available at this activity and it was not until 0800 that the patient left by small boat on a four-hour trip to a vessel with recompression facilities available. The medical officer did not accompany the patient nor did he provide anyone who had full knowledge of the case to accompany the patient. He arrived at the naval vessel with a recompression chamber twenty-one hours after the second dive and eighteen hours after the onset of symptoms and was immediately placed in the chamber and treated as follows:

100 feet.....Breathing air.....30 minutes
40 feet.....Breathing air.....15 minutes
30 feet.....Breathing air.....40 minutes
20 feet.....Breathing air.....52 minutes
10 feet.....Breathing air.....68 minutes

Following this treatment the patient was symptom free; however, after consultation with the Navy diving medical officer, it was decided to give further treatment as the initial treatment seemed inadequate. The patient was placed in the recompression chamber at 1725, taken to the pressure equivalent to 100 feet and decompressed as follows:

100 feet.....Breathing air.....30 minutes
80 feet.....Breathing air.....12 minutes
60 feet.....Breathing air.....30 minutes
50 feet.....Breathing air.....30 minutes
40 feet.....Breathing air.....30 minutes
30 feet.....Breathing air..... 9 hours, 25 minutes

(Not Restricted)

At 0434, after 9 hours and 25 minutes at 30 feet, the patient experienced a recurrence of pain in the left shoulder, elbow, and wrist. He was in great agony and could barely move his arm. He was immediately recompressed and received relief at 45 feet, but was taken to 165 feet and treated as follows:

165 feet	Breathing air	30 minutes
140 feet	Breathing air	12 minutes
120 feet	Breathing air	12 minutes
100 feet	Breathing air	12 minutes
80 feet	Breathing air	12 minutes
60 feet	Breathing oxygen	30 minutes
50 feet	Breathing oxygen	30 minutes
40 feet	Breathing oxygen	30 minutes
30 feet	Breathing oxygen	12 hours, 2 minutes

(During the 30 ft. stop he was put on a schedule of oxygen for 1 hour. However, during the second hour of oxygen, he developed toxic symptoms and he was put on oxygen for 15 minutes every hour. Thus he actually received 5 hours and 24 minutes of oxygen.)

20 feet	Breathing air	12 hours
10 feet	Breathing air	2 hours, 3 minutes

Following this treatment the patient was observed for 72 hours and showed no evidence of recurrence or residual effects of oxygen toxicity.

2. It should be noted that no immediate decompression was given the diver although two dives of 2 hours' duration each were made to 88 feet. It is the responsibility of the diving officer to see that adequate decompression is given following each dive. In accordance with the standard decompression tables set forth in reference (a), the maximum time that a diver should remain at 88 feet without decompression is 30 minutes. In the subject case where a second dive was made within 24 hours, the ascent on the second dive would generally have been governed by the following rule: Take the total combined time of exposure on both dives and use a decompression for that length of exposure at the depth of the latter dive.

3. Since relief from the recurrence at 30 feet was received at 45 feet upon recompression, it is considered that the treatment should have been to take the patient to the 50 ft. depth and treat in accordance with the following table:

50 feet	Breathing air	6 hours
40 feet	Breathing air	6 hours
30 feet	Breathing air	12 hours

(Not Restricted)

20 feet.....Breathing air..... 2 hours
10 feet.....Breathing air..... 2 hours
To Surface.....Breathing air..... 1 minute

The above treatment is in accordance with the latest treatment table disseminated by Bureau of Ships letter P3-2(883), EN28/A2-11, to all ships and stations, dated 24 July 1945. (N. D. Bul. of 31 July 1945, 45-917.)

4. In addition, it is noted that the seriousness of the first symptoms was not immediately recognized and apparently no effort was made to properly treat the diver until several hours after the onset of pain. Also, the patient, while suffering pain, was sent on an extensive trip via small boat without being properly accompanied by one or more officers or men thoroughly familiar with diving and the seriousness of caisson disease as well as someone fully informed as to the case history of the recent dives made by the patient.

5. The provision of the diving manual and superseding instructions relative to decompression or recompression following each dive should be followed explicitly. Also, good practice requires that qualified personnel remain in attendance in each case of caisson disease (bends) from the time of diagnosis until treatment has been completed.

6. All reported cases of compressed-air illness should be forwarded to the Bureau of Medicine and Surgery, via the Bureau of Ships. All reports of diving accidents should be forwarded to or via the Bureau of Ships.

--BuShips, E. L. Cochrane.

* * * * * *

(Not Restricted)
Op21D-jc
Serial 34P21
13 November 1945

To: All Ships and Stations.

Subj: General Order No. 225 - Instructions and Regulations for the Prevention, Control, and Treatment of Venereal Disease.

Ref: (a) Copy of General Order No. 225.

1. Enclosure (A) is promulgated in advance of a printed copy.

--OpNav. B. H. Bieri.

Enclosure (A)

GENERAL ORDER
NO. 225

Navy Department,
Washington, D. C., 8 November 1945

INSTRUCTIONS AND REGULATIONS FOR THE PREVENTION, CONTROL, AND TREATMENT OF VENEREAL DISEASE

(Not Restricted)

1. General Orders Nos. 14 and 97 are hereby canceled.

2. Most persons who come into the Navy are young and inexperienced and are therefore to be warned particularly of the dangers to which they will be exposed if they indulge in illicit sexual relations. Emphasis shall be laid upon the moral and physical evils of incontinence. It shall be made clear that continence is not incompatible with health and the fullest degree of physical and mental vigor.

3. All personnel of the Navy shall receive thorough instruction as to the nature and dangers of the venereal diseases and they shall be warned that continence is the only sure means of avoiding them. As much use as possible shall be made of literature, posters, motion pictures, or other material provided by the Bureau of Naval Personnel and the Bureau of Medicine and Surgery to supplement instruction given by medical officers.

4. All personnel shall be informed that in case of exposure to possible venereal disease, contrary to instruction, advice, and warning, they should report as soon as possible to a naval medical department facility for medical prophylactic treatment or utilize other adequate prophylactic facilities.

5. Wherever medical-department facilities exist, provision will be made for the examination and treatment of personnel who have acquired a venereal disease or have been exposed to infection. All personnel upon returning to their ships or stations shall be given opportunity to report voluntarily at the dispensary for prophylactic treatment in case of exposure to possible venereal disease. Those reporting exposure to possible venereal disease shall receive adequate prophylactic treatment, and at first sign or symptom of actual venereal disease, prompt therapeutic treatment shall be administered. When large liberty parties are sent ashore or other conditions make it advisable, proper facilities for giving prophylactic treatment shall be provided in a suitable place ashore if practicable.

6. Whenever, in the opinion of the medical officer of a ship or shore establishment, there is reason to believe venereal diseases are being concealed by any persons in the naval service attached thereto, he shall, with the approval of the commanding officer, conduct such examination as may be necessary for the detection of concealed cases and administer adequate treatment when indicated.

7. Every person in the naval service who has symptoms of venereal infection shall report his condition immediately upon the appearance of such symptoms and accept any recommended treatment therefor. In the event he breaches this duty the effects of the venereal disease shall be presumed to be due to willful misconduct. A determination of misconduct is warranted in a case in which there has been unreasonable delay in reporting to a naval medical-department facility, i.e., where the individual concerned has delayed longer in reporting than an ordinarily prudent person would do after developing such symptoms as a layman

(Not Restricted)

would recognize as indications of the possible presence of a venereal infection.

8. Failure immediately to report the existence of a venereal disease and receive treatment therefor constitutes a violation of this general order. However, if the infected person voluntarily reports his symptoms to a naval medical-department facility or to his commanding officer, while he may administratively be held to be in a misconduct status so far as the disease is concerned if such report is unreasonably delayed, no disciplinary action shall be taken regardless of the lapse of time between date of infection and date of voluntary report.

9. Persons under treatment for venereal diseases shall not be granted liberty while in an infective stage, except in case of urgent business or imperative personal necessity.

10. The first section of an act of September 27, 1944, ch. 426, 58 Stat. 752, effective from September 27, 1944, repealed section 2 of an act of May 17, 1926, ch. 302, 44 Stat. 557. Section 2 of the act of May 17, 1926, supra, provided for forfeiture of pay of any person in the active military or naval service absent from his regular duties for more than one day at any one time on account of the direct effects of a venereal disease due to his own misconduct. Accordingly, subsequent to September 26, 1944, forfeiture of pay of naval personnel is not authorized in any case of disability resulting from venereal disease.

11. Section 2 of the act of September 27, 1944, supra, amended paragraph VIII of Executive Order No. 6098 (Veterans Regulation No. 10, as amended; 38 U. S. C. ch. 12) to read as follows:

> "Par. VIII. An injury or disease incurred during military or naval service will be deemed to have been incurred in line of duty and not the result of the veteran's own misconduct when the person on whose account benefits are claimed was, at the time the injury was suffered or disease contracted, in active service in the military or naval forces, whether on active duty, or on authorized leave, unless such injury or disease was the result of his own willful misconduct: Provided, That venereal disease shall not be presumed to be due to willful misconduct if the person in service complies with the Army or Navy regulations requiring him to report and receive treatment for such disease; Provided further, That the requirement for line of duty will not be met if it appears that at the time the injury was suffered or disease contracted the person on whose account benefits are claimed (1) was avoiding duty by deserting the service, or by absenting himself without leave materially interfering with the performance of military duties; (2) was confined under sentence of court martial or civil court."

Insofar as they relate to venereal disease, the provisions of paragraph VIII of Executive Order No. 6098, quoted above, apply to determinations of line of duty

(Not Restricted)

and misconduct in the naval service.

--SecNav. James Forrestal.

* * * * * *

(Not Restricted)
BuMed-N-vh, S94
28 November 1945

To: All Ships and Stations.

Subj: Revision of Special Report on Diving Accidents.

Ref: (a) Par. 1280, Manual of the Medical Department.

Enc: (A) Copy of "Report on Caisson Disease or Diving Accident," NavMed 816 (Rev. 10-45).

1. In order to facilitate ease of reporting diving accidents, the letter report as required in reference (a) is herewith changed to a form report hereafter to be known as "Report of Caisson Disease or Diving Accident" (NavMed 816).

2. Effective 1 January 1946, all medical activities attached to naval organizations in which diving is performed (actual, research, or experimental) shall submit Form NavMed 816 to the Bureau of Medicine and Surgery, and a duplicate to the Experimental Diving Unit, Navy Yard, Washington, D. C., on each individual who develops compressed-air illness, air embolism, diver's squeeze, or other type of diving accident (excluding asphyxiation), as soon after occurrence as practicable.

3. An initial supply of Form NavMed 816 will be forwarded to activities which have submitted letter reports prior to 1 January 1946. Activities which have not received their initial supply of these forms by 1 January 1946 may requisition a supply from the nearest naval medical supply depot as follows:

Stock No.	NavMed	Item Title	Unit
S16-911	816	Report of Caisson Disease or Diving Accident	50 in Pad

If printed forms are not available by 1 January 1946, activities shall substitute a typewritten copy according to the form indicated by enclosure (A).

4. Subparagraphs (b) and (c) of reference (a) are canceled effective 1 January 1946 and are superseded by the following:

Par. 1280 (b):

"The medical officer shall submit a report of all cases of compressed-air illness, air embolism, diver's squeeze, or other type of diving accident, to the Bureau and a duplicate to the Experimental Diving Unit, Navy Yard, Washington, D. C., on NavMed 816 as soon after occurrence as practicable.

REPORT OF CAISSON DISEASE OR DIVING ACCIDENT INSTRUCTIONS - See MMD
NAVMED - 816 (Rev. 10/45) Original - to BUMED, Washington 25, D.C.
Duplicate - to Experimental Diving Unit, Navy Yard, Wash., D. C.

NAME AND ADDRESS OF REPORTING STATION | DATE

NAME *(Surname first)* | SERVICE NUMBER | RANK OR RATE

DATE OF BIRTH | WEIGHT *(Pounds)* | HEIGHT *(Inches)*

TYPE OF DIVE ☐ WET ☐ DRY

TYPE OF SUIT ☐ DEEP SEA ☐ CLOSED CIRCUIT ☐ SHALLOW WATER FACE MASK

DEPTH OF DIVE *(Feet)* | TIME ON BOTTOM *(Minutes)*

TYPE OF WORK ☐ MILD ☐ MODERATE ☐ HEAVY

BREATHING MEDIA ☐ HELIUM ☐ OXYGEN ☐ AIR

SOURCE OF BREATHING MEDIA ☐ HAND PUMP ☐ AIR BANKS ☐ GASOLINE COMP. ☐ OTHER

DIVE

DECOMPRESSION PROCEDURE ☐ STANDARD ☐ SURFACE

RATE OF ASCENT TO FIRST STOP FEET/MIN.

DECOMPRESSION SCHEDULE		DEPTH OF STOP *(Feet)* 90	80	70	60	50	40	30	20	10
WATER	Minutes at stop									
	Breathing media									
CHAMBER	Minutes at stop									
	Breathirg media									

TIME FROM LAST WATER STOP TO FIRST CHAMBER STOP IF SURFACE DECOMPRESSION USED. | SURFACED *(Date)* *(Time)*

SYMPTOMS

DATE | TIME OF ONSET | ANATOMIC LOCATION

☐ RASH ☐ DIZZINESS ☐ NUMBNESS ☐ LOCALIZED PAIN ☐ MUSCULAR WEAKNESS

☐ CHOKES ☐ VISUAL DISTURBANCES ☐ PARALYSIS ☐ UNCONSCIOUSNESS

OTHER SIGNIFICANT SYMPTOMS:

TREATMENT

DATE BEGUN | TIME LEFT SURFACE | TIME REACHED BOTTOM | DEPTH WHEN RELIEVED *(Feet)*

DECOMPRESSION SCHEDULE		DEPTH OF STOP *(Feet)* 165	140	120	100	80	60	50	40	30	20	10
CHAMBER	Minutes at stop											
	Breathing media											

SURFACED *(Date)* *(Time)*

CONDITION FOLLOWING TREATMENT *(if recurrence of symptoms develope, outline treatment procedure on reverse side.)*

REMARKS:

(Reporting Officer)

**If not, indicate in remarks.*

(Not Restricted)

Asphyxiation cases which do not present evidence of caisson disease or other serious type of diving accident, but require some form of artificial resuscitation, shall be reported as directed in 'All Ships and Stations letter BUMED-X-BLW IIP3-2 of 8 Feb 1945'."

Par. 1280 (c):

"When special rescue or salvage operations involving extensive diving operations are performed, it is desired that the medical officer submit a report covering the medical aspects of diving to the officer in charge of the salvage operation, which report shall be included in the latter's salvage report. This report shall summarize the depth, number, and duration of dives per diver, decompression schedules for ascent and departure therefrom, and the number of diving accidents which occurred during the operation."

--BuMed. Ross T. McIntire.

LT.JG E.G. CARDWELL W-VS H USNR.
BUREAU OF MEDICINE & SURGERY,
NAVY DEPARTMENT,
WASHINGTON 25, D.C.
BLDG. 3, ROOM 11 X